Long-COVID Resource Guide

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COVID-19 is not over.

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Congratulations!

COVID-19 is not over.

While our media and public officials have been pushing the narrative that the worst is behind us, those who have chosen to stay informed know that hundreds of people are still dying of COVID every day in the United States alone, and millions of people are becoming disabled due to the long-term impacts of COVID-19 infection on the brain and body, also known as Long-COVID. Every single person is at risk of developing Long-COVID after COVID infection, regardless of vaccination status, no matter how mild or asymptomatic the case, and regardless of whether the person has any known underlying conditions. We also know that having COVID before does not safeguard anyone from contracting it again, nor from serious consequences. In fact, repeat COVID infections increase the risk of death and development of serious long-term health issues. Compared to people with first infection, reinfection contributes additional risks of all-cause mortality, hospitalization, and adverse health outcomes in the pulmonary and several extrapulmonary organ systems (cardiovascular disorders, coagulation and hematologic disorders, diabetes, fatigue, gastrointestinal disorders, kidney disorders, mental health disorders, musculoskeletal disorders, and neurologic disorders).

This is a resource for those wanting sources about all the various impacts of Long-Covid, as well as the effectiveness of masking in reducing COVID transmission.

You are invited to share this resource with anyone who may be unaware of the dangers of COVID beyond acute infection, as well as those who are still ignorantly claiming that masks do not work, that COVID infection is not dangerous, and/or that Long-COVID is not real.

We must work together to raise awareness of the science that is not being shared or followed by public officials. Please share this resource widely.

Looking to get in touch? Find me on Twitter: @SashLG413

If you would like to pay me for the time and energy I spent reading and compiling all of these studies, my Venmo is @Sash413. Thank you so much for acknowledging my effort!

The Impacts of Long-COVID on the Brain & Body

1 - General impact

Over 3 times the risk of dying over the following year post-infection:
https://www.thelancet.com/journals/lanepe/article/PIIS2666-7762(22)00087-4/fulltext

Over 50 long-term effects of COVID-19:
https://www.nature.com/articles/s41598-021-95565-8

Over 200 symptoms across 10 organ systems:
https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(21)00299-6/fulltext

10 life-threatening Omicron side effects after recovery:
https://nypost.com/2022/02/24/the-10-life-threatening-omicron-side-effects-plaguing-covid-survivors/

Organ dysfunction:
https://www.cdc.gov/mmwr/volumes/71/wr/mm7121e1.htm

Heart and brain problems are ongoing up to a year after infection with COVID, even in people who had mild COVID-19:
https://www.heart.org/en/news/2022/03/31/after-covid-19-experts-say-watch-for-these-potential-heart-and-brain-problems

How Long-COVID exhausts the body:
https://www.nytimes.com/interactive/2022/02/19/science/long-covid-causes.html

More than 10 million children have lost a parent or carer from COVID. Consequences for children can be devastating, including institutionalization, abuse, traumatic grief, mental health problems, adolescent pregnancy, poor educational outcomes, and chronic and infectious diseases:
https://jamanetwork.com/journals/jamapediatrics/fullarticle/2795650

This article is a discussion about the above linked study re: children losing parents/carers:
https://www.nature.com/articles/d41586-022-02941-z

2 - **Changes/damage to the brain**

Changes in brain structure:
https://www.nature.com/articles/s41586-022-04569-5

Brain changes that show parallels to Alzheimers:
https://www.medpagetoday.com/neurology/generalneurology/97034

Different types of brain damage:
https://www.axios.com/2022/03/10/covid-brain-fog-damage

Longstanding memory problems and brain fog:
https://www.cidrap.umn.edu/news-perspective/2022/03/70-covid-survivors-uk-study-had-impaired-memory-focus

A thread by a renowned MD (with sources) about how studying brain imaging and cerebrospinal fluid can show the impacts of COVID:
https://twitter.com/weselymd/status/1501717860942553089?s=21&t=IGm7tlqc_JuUcDtMmBcMng

Brain cell deterioration and death even after the virus stops actively replicating during infection:
https://www.researchsquare.com/article/rs-1762855/v1

Mild COVID destroys the brain:
https://www.biorxiv.org/content/10.1101/2022.06.22.497189v1

Cognitive dysfunction:
https://www.medicalnewstoday.com/articles/how-common-are-cognitive-symptoms-of-long-covid

Brain injury symptoms of inflammation and cell death:
https://www.medicalnewstoday.com/articles/long-covid-primate-study-reveals-forms-of-brain-injury

Increased risk of psychotic disorder, cognitive deficit, dementia, and epilepsy or seizures:

https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(22)00260-7/fulltext

Neurovascular injury and sudden death during COVID-19 infection and with Long-COVID is likely triggered by antibody-mediated cytotoxicity directed at endothelial cells, initiating event that leads to vascular leakage, platelet aggregation, neuroinflammation, and neuronal injury: https://academic.oup.com/brain/article/145/7/2555/6621999#367397462

COVID-19 infections increase risk of long-term brain problems. Strokes, seizures, memory, and movement disorders among problems that develop in first 12 months after infection: https://www.nature.com/articles/s41591-022-02001-z#Sec20

This article discusses the previous study about the long-term brain problems resulting from COVID. Compared with those in the control groups, people who contracted the virus were at a 77% increased risk of developing memory problems; 50% more likely to suffer from an ischemic stroke, which strikes when a blood clot or other obstruction blocks an artery's ability to supply blood and oxygen to the brain; 80% more likely to suffer from epilepsy or seizures; 43% more likely to develop mental health disorders, such as anxiety or depression; 35% more likely to experience mild to severe headaches; and 42% more likely to encounter movement disorders, including involuntary muscle contractions, tremors and other Parkinson's-like symptoms: https://medicine.wustl.edu/news/covid-19-infections-increase-risk-of-long-term-brain-problems/

3 - **Heart/cardiovascular issues**

Persistent cardiac symptoms in individuals with mild initial COVID-19: https://www.nature.com/articles/s41591-022-02000-0

Risk of heart disease and stroke skyrockets in those who have had COVID: https://www.nature.com/articles/d41586-022-00403-0

Heart problems and more: https://www.heart.org/en/news/2022/03/31/after-covid-19-experts-say-watch-for-these-potential-heart-and-brain-problems

Risk of blood clots in the lungs (acute pulmonary embolism) doubles:
https://medicalxpress.com/news/2022-05-blood-clots-lung-covid-survivors.html

Increased risk of cardiovascular disease including cerebrovascular disorders, dysrhythmias, ischemic and non-ischemic heart disease, pericarditis, myocarditis, heart failure, and thromboembolic disease:
https://www.nature.com/articles/s41591-022-01689-3

Risks of deep vein thrombosis, pulmonary embolism, and bleeding after COVID infection:
https://www.bmj.com/content/377/bmj-2021-069590

Coronavirus spike protein activates natural immune response, damages heart muscle cells:
https://medicalxpress.com/news/2022-07-coronavirus-spike-protein-natural-immune.html

Virus spike protein toxic to heart cells, reinfection and severe outcomes more common with BA.5 variant:
https://www.reuters.com/business/healthcare-pharmaceuticals/reinfection-severe-outcome-more-common-with-ba5-variant-virus-spike-protein-2022-07-28/

4 - Kidney function

35% of COVID patients had reduced kidney functioning:
https://www.nature.com/articles/s41581-021-00487-3

More than 30% of patients hospitalized with COVID-19 develop kidney injury, and more than 50% of patients in the intensive care unit with kidney injury may require dialysis:
https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/coronavirus-kidney-damage-caused-by-covid19

People with COVID-19 are at increased risk of acute kidney injury, chronic kidney disease, and end-stage kidney disease. This increased risk is evident even in people with mild COVID infection that did not require hospitalization:
https://www.medpagetoday.com/opinion/second-opinions/94886

Patients who survived COVID-19 exhibited increased risk of kidney outcomes in the post-acute phase of the disease:
https://jasn.asnjournals.org/content/32/11/2851

5 - **Liver damage**

43% of MILD cases and 74% of severe cases in this study had liver damage from infection:
https://www.frontiersin.org/articles/10.3389/fmed.2021.651658/full

Impaired liver function and increased liver fibrogenesis:
https://bmcgastroenterol.biomedcentral.com/articles/10.1186/s12876-021-01939-7

Multiple liver abnormalities after COVID infection:
https://gut.bmj.com/content/early/2022/06/14/gutjnl-2021-326792

COVID-19 can cause liver injury observable using multiparametric ultrasound:
https://onlinelibrary.wiley.com/doi/full/10.1002/jum.15778

6 - **Nervous system disorders**

67% of people with Long-COVID develop dysautonomia, an autonomic nervous system disorder:
https://dysautonomiainternational.org/pdf/LongCOVID_Dysautonomia_PressRelease.pdf

Nerve damage:
https://www.medicalnewstoday.com/articles/nerve-damage-in-long-covid-may-arise-from-immune-dysfunction#Patient-recruitment

Virus- or immune-mediated disruption of the autonomic nervous system resulting in orthostatic intolerance syndromes, impaired autonomic physiology in Long-COVID:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7850225/

The Long-COVID neurological symptoms such as fatigue, anosmia, hypogeusia, headaches, and hypoxia may be a result of dysautonomia caused by COVID:
https://www.nature.com/articles/s41598-021-93546-5#Abs1

COVID mitochondrial damage leads to parasympathetic and sympathetic autonomic

dysfunction, which affects the control and coordination of all systems throughout the whole body, and may explain all of the symptoms of Long-COVID:
https://www.mdpi.com/2673-4087/3/2/21/htm

7 - **Gastrointestinal issues**

Severe ulcerative colitis:
https://www.cureus.com/articles/98995-severe-ulcerative-colitis-as-a-complication-of-mild-covid-19-infection-in-a-vaccinated-patient

In patients with Long-COVID, gastrointestinal-related symptomatology includes loss of appetite, nausea, weight loss, abdominal pain, heartburn, dysphagia, altered bowel motility, and irritable bowel syndrome:
https://www.nature.com/articles/s41575-022-00611-z

Coronavirus found in patients' stool 7 months after infection suggests prolonged gastrointestinal infection. The presence of viral COVID RNA in the samples correlated with gastrointestinal symptoms, such as abdominal pain, nausea, and vomiting as well as runny nose, headache, and body aches, showing that COVID likely infects gastrointestinal tissue:
https://www.cell.com/med/fulltext/S2666-6340(22)00167-2

COVID can affect any part of the digestive system, not only in the acute infection phase, but also for longer time, leaving long-term sequelae:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9177081/

GI symptoms in patients were seen in 12% after acute COVID infection and 22% as part of Long-COVID. Loss of appetite, dyspepsia, irritable bowel syndrome, loss of taste, and abdominal pain were the five most common GI symptoms of Long-COVID. Having a mild case made no difference in the development of GI manifestations:
https://journals.sagepub.com/doi/full/10.1177/17562848221118403#_i27

Long-term gastrointestinal effects of COVID infection:
https://scholar.harvard.edu/cvt/covid-long-haulers-gastrointestinal-system%C2%A0

8 - **Immunological issues**

Autoantibodies that perturb immune function:
https://www.nature.com/articles/s41586-021-03631-y

Ongoing, sustained inflammatory response following even mild COVID case, immune dysregulation:
https://www.nature.com/articles/s41590-021-01113-x

Profound alterations/defects in many immune cell types often persist for weeks or even months after COVID infection:
https://www.medrxiv.org/content/10.1101/2021.01.11.20248765v1

Persistent changes to the peripheral immune system until at least 6 months post-infection (even in mild cases). These significant alterations to the peripheral immune system (including increased number of immune cells and antibodies, as well as a strong dysregulation of gene expression–the information stored in DNA that governs the way cells react to changing environments) could also have implications for how individuals recovering from COVID infection respond to other infections encountered in this period. This persistent immune activation may also exacerbate other chronic conditions:
https://bmcmedicine.biomedcentral.com/articles/10.1186/s12916-021-02228-6

Rogue antibodies found in blood up to seven months after COVID infection:
https://www.medrxiv.org/content/10.1101/2021.01.21.21249176v1

Autoimmunity is playing a role in Long-COVID. Patients are showing signs of autoimmune disease a year after infection. Antibodies that target healthy cells and tissues in the body and that are known to contribute to autoimmune diseases were found in 80% of the study's 106 patients 3-6 months after their initial infection, and in 41% of them after one year:
https://erj.ersjournals.com/content/early/2022/08/04/13993003.00970-2022

9 - **Metabolic disease/diabetes**

Impaired blood sugar processing:
https://www.reuters.com/business/healthcare-pharmaceuticals/epstein-barr-may-play-role-some-long-covid-coronavirus-can-impair-blood-sugar-2022-06-27/

Risk of Diabetes, especially Type 2, increases by 40%:
https://www.nature.com/articles/d41586-022-00912-y

Increased likelihood of new-onset diabetes during the acute phase or shortly after recovering from infection with severe acute COVID:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8251301/

Newly diagnosed diabetes may be observed as frequently as preexisting diabetes in hospitalized COVID-19 patients:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7737525/

Metabolic rewiring and serotonin depletion in patients with Long-COVID:
https://onlinelibrary.wiley.com/doi/10.1111/all.15253

COVID-19 leads to new-onset diabetes or aggravation of pre-existing metabolic disorders:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8489878/

Necroptotic cell death, immune cell infiltration, and COVID viral infection of pancreatic beta-cells may contribute to varying degrees of metabolic dysregulation in patients with COVID-19:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8192507/

Metabolic-associated fatty liver disease was highly prevalent after COVID infection with potential long-term metabolic and cardiovascular health implications:
https://academic.oup.com/ofid/article/9/3/ofac003/6501509

10 - **Risk of suicide**

Almost 50% more likely to experience suicidal ideation:
https://time.com/6186429/suicide-long-covid/

COVID's link to suicide:
https://www.reuters.com/business/healthcare-pharmaceuticals/long-covids-link-suicide-scientists-warn-hidden-crisis-2022-09-08/

Long-COVID & suicide risk:
https://news.yahoo.com/long-covid-patients-struggle-suicide-051612786.html

In this personal anecdote, a grieving husband shares his experience losing his wife to suicide after a 13-month battle with Long-COVID that started as a mostly asymptomatic COVID infection. He shares that Long-COVID "took her from one of the healthiest, most vibrant people I've ever known to a person so debilitated that she could not bear another day on this planet." https://www.theguardian.com/commentisfree/2022/jan/12/long-covid-wife-suicide-give-others-hope

Polls point to a rise in suicidal ideation among those with Long-COVID: https://www.independent.co.uk/news/health/long-covid-depression-suicide-treatment-b2104764.html

Months-long suffering from Long-COVID symptoms has been linked to severe depression, anxiety, and suicidal ideation:
https://www.insider.com/long-term-covid-sufferers-are-killing-themselves-heres-why-2021-4

11 - **Sexual function**

COVID-19 Infection is Associated With New Onset Erectile Dysfunction: https://pubmed.ncbi.nlm.nih.gov/34931145/#affiliation-2

This article discusses the above linked study on new onset erectile dysfunction (ED). Long-COVID could be leading to a wave of ED, with the risk of being diagnosed with erectile dysfunction about 20% higher in those who had COVID-19 versus those who did not: https://fortune.com/2022/08/17/long-covid-erectile-dysfunction-link-pandemic-health-carolyn-barber/

Clinical case report - Deep dorsal penile vein thrombosis in a patient with COVID-19 infection: A rare complication and the first reported case. Blood clots are a known development after COVID infection; this man developed blood clots in the his deep dorsal penile vein, causing severe pain in his penis and groin:
https://pubmed.ncbi.nlm.nih.gov/34931145/#affiliation-2

Testicular pain, erectile dysfunction, hypogonadism, reduced sperm count and quality, and decreased fertility associated with acute COVID-19 infection are a direct consequence of COVID infection of the penis, testicles, and prostate (male reproductive tract). Clinical studies suggest 10% to 20% of COVID-infected men (tens of millions) have symptoms related to male genital tract dysfunction:
https://medicalxpress.com/news/2022-03-covid-infects-penis-testicles-prostate.html

Children & Long-COVID

Post-infection hepatitis:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7655704/#!po=1.21951

Even kids with asymptomatic or mild cases are at risk of respiratory, cardiac, neurological, respiratory, and psychological issues:
https://link.springer.com/article/10.1186/s13052-022-01282-x

Long-COVID can affect children of all ages, including infants:
https://www.thelancet.com/journals/lanchi/article/PIIS2352-4642(22)00154-7/fulltext

Heart inflammation among most common Long-COVID conditions in children:
https://jamanetwork.com/journals/jamapediatrics/fullarticle/2795569

Long-COVID liver manifestation in children:
https://journals.lww.com/jpgn/Abstract/2022/09000/Long_COVID_19_Liver_Manifestation_in_Children.5.aspx

The prevalence of Long-COVID in children is estimated to be anywhere from 5% to 10%. Long-term symptoms were more prevalent in children 14 years and older:
https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2794484

A general overview of Long-COVID in kids:
https://time.com/6205539/long-covid-kids-symptoms/

About 25% of kids and adolescents who contract COVID have symptoms that last at least 4 weeks. The most prevalent clinical manifestations were mood symptoms (16.50%), fatigue (9.66%), and sleep disorders (8.42%). Children infected by COVID had a higher risk of persistent dyspnea, anosmia/ageusia, and/or fever :
https://www.nature.com/articles/s41598-022-13495-5

Over 1 in 4 unvaccinated children with a COVID case bad enough to be hospitalized had persistent symptoms or activity impairment 2-4 months later: https://publications.aap.org/pediatrics/article/150/3/e2022057798/188356/Health-Impairments-in-Children-and-Adolescents?utm_source=STAT+Newsletters

Children and teens with Long-COVID are twice as likely to develop cardiovascular and kidney problems after COVID infection. These include heart inflammation (myocarditis), heart muscle disease (cardiomyopathy); a blood clot in the lung (acute pulmonary embolism); a blood clot that begins in the vein of the leg or arm (venous thromboembolic event); acute and unspecified renal failure; and type 1 diabetes: https://www.cdc.gov/mmwr/volumes/71/wr/mm7131a3.htm?s_cid=mm7131a3_w

Persistent pulmonary (lung) dysfunction in both children and adolescents recovered from COVID-19 and with Long-COVID: https://pubs.rsna.org/doi/10.1148/radiol.221250

Long-COVID & Pregnancy

Covid-19 in pregnancy increases the risk of severe complications for both mother and baby: https://www.bmj.com/content/377/bmj-2022-071296

Inflammation from a COVID-19 infection during pregnancy could potentially impact long-term infant health: https://www.nature.com/articles/s41372-022-01391-9

Further discussion of above study on increased maternal and infant inflammatory cytokines: https://www.bmc.org/news/inflammation-markers-associated-covid-19-during-pregnancy-may-signal-adverse-impacts-long-term

Persistent fatigue post-COVID-19 in pregnant women with mild COVID cases: https://www.researchsquare.com/article/rs-1629974/v1

Maternal COVID may be associated with neurodevelopmental sequelae in some offspring: https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2793178

Severe COVID-19 in pregnancy associated with preterm birth, as well as other complications during and after pregnancy, including cesarean delivery, postpartum hemorrhage, hypertensive disorders of pregnancy, and preterm birth:
https://www.nichd.nih.gov/newsroom/news/012821-GRAVID

Early pandemic studies showed pregnant people were 50% more likely to end up in intensive care units than their nonpregnant peers, and were also 70% more likely to need ventilators:
https://www.science.org/content/article/why-pregnant-women-face-special-risks-covid-19

Impact on the Economy & Healthcare System

More than 1 million people could be out of the labor market at any given time (this was a conservative estimate that has since been updated, see the Brookings article in next source):
https://www.boston.com/news/coronavirus/2022/05/17/harvard-economist-on-the-costs-of-long-covid-we-should-worry-about-it/?amp=1

New data shows Long-COVID is keeping as many as 4 million people out of work. The economic burden of lost wages is approaching $200 billion a year—and likely to rise:
https://www.brookings.edu/research/new-data-shows-long-covid-is-keeping-as-many-as-4-million-people-out-of-work/?amp

The potential impact on heart and brain disease poses challenges to healthcare systems globally:
https://www.ft.com/content/26e0731f-15c4-4f5a-b2dc-fd8591a02aec

Less than 10% of people with Long-COVID develop functional gastrointestinal disorders (FGIDs), but FGIDs are disorders of brain–gut interaction and are notoriously difficult to manage. FGIDs lead to increased healthcare utilization in both primary and secondary care. To date, an estimated 270 million of the global population have been infected with COVID. If <10% of these patients develop FGIDs globally, the potential for an increased healthcare, economic, and social burden from these Long-COVID FGIDs could be phenomenal.
https://onlinelibrary.wiley.com/doi/10.1111/jgh.15776

Even the lower-end estimate of 12% of people with 3 or more symptoms of Long-COVID implies that 9.6 million people in the US may have developed Long-COVID—roughly 10 times the number of COVID deaths. 4% of people with Long-COVID are out of the labor force and 51% work fewer hours. This workers shortage in these is driving up both wages and prices. Part of the recent surge in inflation in the US may be related to Long-COVID.
https://jamanetwork.com/journals/jama-health-forum/fullarticle/2792505

The management and care of individuals with Long-COVID is likely to become a substantial burden for healthcare systems worldwide.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8274847/

People who are no longer able to work due to Long-COVID may lose their existing medical insurance coverage and would also experience loss of income.
https://www.kff.org/policy-watch/what-are-the-implications-of-long-covid-for-employment-and-health-coverage/

With more than 30 million U.S. adults estimated to have had, or have, Long-COVID, the costs of care will add up significantly for individuals, employers, and health insurers.
https://centerforhealthjournalism.org/2022/04/15/high-price-long-covid

Understanding the long-term societal impacts of COVID:
https://www.thebritishacademy.ac.uk/publications/covid-decade-understanding-the-long-term-societal-impacts-of-covid-19/

Prevalence & Length of Long-COVID

Only 1 in 4 Long-COVID patients recover after a year:
https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(22)00127-8/fulltext

Vaccinated people with mild COVID cases still suffer with Long-COVID after one year:
https://www.nbcnews.com/news/amp/rcna29834

How common is long COVID? Why studies give different answers:
https://www.nature.com/articles/d41586-022-01702-2

1 in 5 COVID-19 survivors aged 18–64 years, and 1 in 4 survivors aged ≥65 years experience a post-acute infection condition:
https://www.cdc.gov/mmwr/volumes/71/wr/mm7121e1.htm?s_cid=mm7121e1_w

About 30% of COVID patients develop Long-COVID:
https://www.sciencedaily.com/releases/2022/04/220419092334.htm

Another recent study suggests 1 in 8 people who were infected with COVID develop Long-COVID:
https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(22)01214-4/fulltext#seccestitle1
30

Mild COVID & Long-COVID

Mild COVID destroys the brain:
https://www.biorxiv.org/content/10.1101/2022.06.22.497189v1

Potential heart and brain problems up to a year after COVID infection, even with mild COVID:
https://www.heart.org/en/news/2022/03/31/after-covid-19-experts-say-watch-for-these-potential-heart-and-brain-problems

Vaccinated people with mild COVID cases still suffer with Long-COVID after one year:
https://www.nbcnews.com/news/amp/rcna29834

Ongoing, sustained inflammatory response following even mild COVID case, immune dysregulation:
https://www.nature.com/articles/s41590-021-01113-x

Persistent cardiac symptoms in individuals with mild initial COVID-19:
https://www.nature.com/articles/s41591-022-02000-0

3% of MILD cases and 74% of severe cases in this study had liver damage from infection:
https://www.frontiersin.org/articles/10.3389/fmed.2021.651658/full

Even mild COVID infections can amplify a person's chance of developing diabetes:
https://www.nature.com/articles/d41586-022-00912-y

Persistent changes to the immune system until at least 6 months post-infection (even in mild cases). These significant alterations to the immune system (including increased number of immune cells & antibodies, as well as a strong dysregulation of gene expression–the information stored in DNA that governs the way cells react to changing environments) may also have implications for how individuals recovering from COVID respond to other infections encountered in this period. This persistent immune activation may also exacerbate other chronic conditions:
https://bmcmedicine.biomedcentral.com/articles/10.1186/s12916-021-02228-6

GI symptoms in patients were seen in 12% after acute COVID infection and 22% as part of Long-COVID. Loss of appetite, dyspepsia, irritable bowel syndrome, loss of taste, and abdominal pain were the five most common GI symptoms of Long-COVID. Having a mild case made no difference in the development of GI manifestations:
https://journals.sagepub.com/doi/full/10.1177/17562848221118403#_i27

Masks Are Effective

Evidence in favor of widespread mask use as source control to reduce community transmission:
https://www.pnas.org/doi/full/10.1073/pnas.2014564118

Mask wearing in community settings reduces SARS-CoV-2 transmission. Policy makers can effectively reduce transmission by intervening to increase mask wearing:
https://www.pnas.org/doi/full/10.1073/pnas.2119266119

Promoting community mask-wearing can improve public health:
https://www.science.org/doi/10.1126/science.abi9069?cookieSet=1

The overall community benefit of wearing masks derives from their combined ability to limit both exhalation and inhalation of infectious virus. The greater the extent to which mask wearing is adopted by the community, the larger the benefit to each individual member. With the emergence of more transmissible COVID variants, it is even more important to adopt widespread mask wearing:
https://jamanetwork.com/journals/jama/fullarticle/2776536

In a classroom setting, when all occupants are wearing masks, aerosol conditional infection probabilities are greatly reduced and reductions of 4×, 10×, or even 100× can be achieved.
https://www.tandfonline.com/doi/full/10.1080/23744731.2021.1944665

High-Quality (KN95, N95) Masks are Essential

In areas of low virus abundance, surgical masks are effective at preventing virus spread. In potentially virus-rich indoor environments, including medical centers and hospitals, more-advanced masks and other protective equipment are required. Masks effectively limit the probability of COVID transmission and work best combination with other preventive measures like ventilation and distancing:
https://www.science.org/doi/10.1126/science.abg6296

When worn properly, N95s can filter out at least 95 percent of particles in the air, including the virus that causes covid-19.
https://www.washingtonpost.com/health/2022/01/20/n95-mask-effectiveness/

Using a respirator (like N95) offers the highest level of protection from COVID infection, although it is most important to wear a well-fitting mask or respirator that is comfortable and can be used consistently.
https://www.cdc.gov/mmwr/volumes/71/wr/mm7106e1.htm

Surgical masks are no longer sufficient in most public settings, well-fitted respirators should be worn:
https://pubmed.ncbi.nlm.nih.gov/35019196/

The filtration, effectiveness, fit, and performance of cloth masks are inferior to those of medical masks and respirators and should only be used when medical masks are unavailable. This article was written during the first year of the pandemic before the more highly transmissible strains of the virus. Cloth masks do not provide enough protection against COVID.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7510705/

N95 respirator use was associated with fewer viral infectious episodes for healthcare workers compared with surgical masks.
https://onlinelibrary.wiley.com/doi/10.1002/emp2.12582

Due to problems with fit, most common masks only filter about 10% of exhaled aerosol droplets. The remaining aerosols are redirected, mostly out the top of the mask where it gaps over the nose, and escape into the air unfiltered. By contrast, higher-quality N95 and KN95 masks filter

more than 50% of exhaled aerosols that can accumulate indoors and spread COVID when inhaled by other people:
https://uwaterloo.ca/news/media/study-supports-widespread-use-better-masks-curb-covid-19

Prevention Strategies

High-quality masks and proper ventilation/air-filtration should be used in combination to mitigate the threat posed by indoor aerosol accumulation:
https://aip.scitation.org/doi/10.1063/5.0057100

HEPA air cleaners can reduce exposure to COVID in indoor environments, especially when combined with universal masking. A combination of HEPA air cleaners and universal masking reduced exposure by up to 90% in this study. Placing two HEPA air cleaners close to the room occupants reduced the aerosol exposure of the uninfected participants and speaker by up to 65%.
https://www.cdc.gov/mmwr/volumes/70/wr/mm7027e1.htm

Because no single approach is 100% effective in preventing COVID, prevention measures work best when layered. Methods to reduce the concentration of COVID particles in indoor air include masking, ventilation, filtration, and disinfection.
https://jamanetwork.com/journals/jama/fullarticle/2793289

With all occupants in an indoor classroom setting wearing masks, aerosol conditional infection probabilities are greatly reduced and reductions of 4×, 10×, or even 100× can be achieved. Use of masks and ventilation simultaneously are synergistic (providing multiplicative reductions) and together can provide greatly reduced aerosol transmission infection probability.
https://www.tandfonline.com/doi/full/10.1080/23744731.2021.1944665

N95 masks that have passed a quantitative fit-test combined with HEPA filtration protects against high virus aerosol loads at close range and for prolonged periods of time.
https://academic.oup.com/jid/article/226/2/199/6582941

We must reduce the number of particles in the air that might be carrying COVID by utilizing ventilation and air filtration methods:
https://www.cnn.com/2022/04/10/health/covid-19-ventilation-matters-wellness/index.html

Higher ventilation, filtration, and humidity levels significantly reduce the amount of COVID virus particles in the air:
https://academic.oup.com/cid/article/75/1/e174/6498295

Changing the air in a room multiple times an hour with filtered or clean outdoor air – using a window fan, higher MERV filters in an HVAC system, portable air cleaning devices, and opening windows – can reduce the risk of COVID transmission, with studies showing five air changes an hour reduce transmission risk by 50%:
https://www.whitehouse.gov/ostp/news-updates/2022/03/23/lets-clear-the-air-on-covid/

Congratulations!

You have made it to the end of this resource guide.

Thank you so much for investing your time and energy into learning about the impacts of Long-COVID and what we can all do to prevent COVID transmission!

To recap: The COVID pandemic is not over. Hundreds of people are still dying every day in the US alone. Roughly 1 in 5 people who are infected with COVID develop Long-COVID, which has already disabled millions of people. We know that mild COVID cases can turn into Long-COVID, we know that repeat infections worsen your risk of developing serious long-term health issues, and we know that there are many wide-ranging, serious consequences of Long-COVID that destroy our body systems.

High-quality masks (N95s & KN95s) are a tool we should be using to mitigate COVID transmission (and prevent the devastating and disabling long-term impacts of Long-COVID). Wearing masks reduces the amount of virus in the air. When an infected person wears a good mask, it catches a lot of the virus coming out of their mouths. When you wear a mask, it filters the air you're breathing in, catching the virus before it hits your airway and infects you. Masks that don't fit well/don't seal against your face and that do not filter out as many particles will not protect you or people around you as well as N95s and KN95s.

Vaccination alone does not prevent COVID transmission. A multi-layered approach that includes high-quality masking, ventilation, & air-filtration can reduce the amount of virus in the air, which will in turn greatly reduce the amount of virus a person could potentially breathe in. Always wear a mask indoors and in crowded outdoor settings.

Please be sure to check back periodically, as this guide will be continuously updated as new research comes out.

If you would like to pay me for the time and energy I spent reading and compiling all of these studies, my Venmo is @Sash413. Thank you so much for acknowledging my effort!